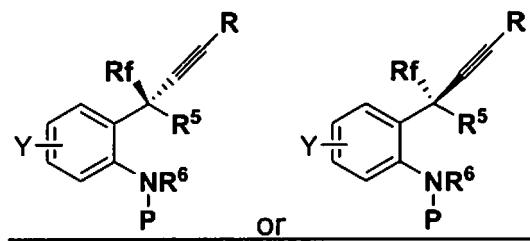


Amendments to the Claims

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

Claim 1 (Currently amended): A process for synthesizing a chiral compound having a formula of



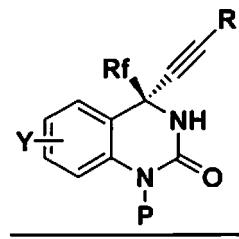
wherein Y is H, mono- or multi-substituted electron-withdrawing group or electron-donating group, and is located at *m*-,*o*-, or *p*-position of the benzene ring;

P is hydrogen or an amino protecting group;

Rf is a fluoro-containing alkyl;

R is a trialkylsilyl, alkyl, cycloalkyl, or aryl group;

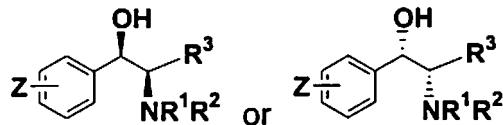
R⁶ is hydrogen and R⁵ is hydroxy, or R⁵ and R⁶ are linked as -HNCO- to form a ring as in



or its enantiomer,

comprising the steps of

(a) mixing a chiral ligand (1R, 2R)-2-N, N- substituted-1-(substituted -phenyl)-2-R³-substituted-2-aminoethanol or its enantiomer having a formula of

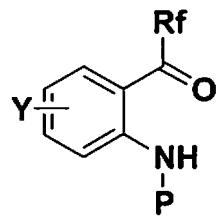


with a terminal alkyne and a Zn(II), Cu(II) or Cu(I) salt in the presence of an organic base in an aprotic solvent to form a mixture,

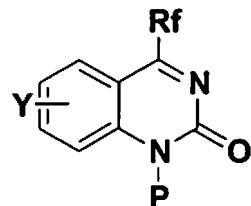
wherein R¹, R² is an amino protecting group; R³ is an alkyl, alkyl-substituted with an alkyloxy or silyloxy, carboxylic group, carbalkoxy group, hydroxyl methyl, cycloalkyl, aryl, or CH₂OR⁴, R⁴ being an oxygen protecting group; Z is H, a mono- or multi-substituted ~~sub~~substituted electron-withdrawing group or electron-donating group, and located at m-, o-, or p-position position of the benzene ring[;], and ~~with a terminal alkyne and a Zn(II), Cu(II) or Cu(I) salt in the presence of an organic base in an aprotic solvent,~~

wherein the terminal alkyne is H—C≡R, and R is a trialkylsilyl, alkyl, cycloalkyl, or aryl group,

(b) mixing with the mixture with a reactant having a formula of



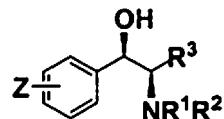
or



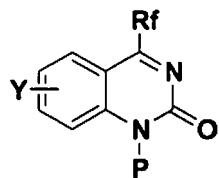
wherein P is hydrogen or an amino protecting group, Rf is a fluoro-containing alkyl, Y is H, a mono- or multi-substituted electron-withdrawing group or electron-donating group and located at *m*-, *o*-, or *p*-positon of the ring[;], and

(c) isolating and obtaining the a chiral compound.

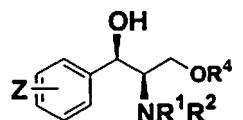
Claim 2 (Currently amended): The process of claim 1, wherein the chiral ligand (1R, 2R)-2-*N*, *N*-substituted-1-(substituted -phenyl)-2-*R*³-substituted-2-aminoethanol or its enantiomer is (1R, 2R)-2-*N,N*-substitutedamino-1-(substituted-phenyl)-2-substituted-2-aminoethanol having a formula of



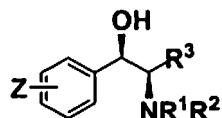
and the reactant is



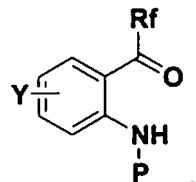
Claim 3 (Previously presented): The process of claim 2, wherein the chiral ligand is (1R, 2R)-2-N,N-substitutedamino-1-(substituted-phenyl)-3-O-R⁴substituted-propane-1-ol or its enantiomer having a formula of



Claim 4 (Previously presented): The process of claim 1, wherein the chiral ligand is (1R, 2R)-2-N,N- substitutedamino-1-(substituted- phenyl)-2-R³-substituted-1-ethanol or its enantiomer having a formula of



and the reactant is



Claim 5 (Previously presented): The process of claim 1, wherein R¹ and R² is an alkyl, substituted alkyl, benzyl, trialkylsilyl, or substituted benzyl, the substituted

group being a phenyl, naphenyl, halo, nitro, hydroxy, C₁~C₃ hydroxyalkyl, C₁~C₄ alkyl, or C₁~C₃ alkoxy, or R¹, R² being -(CH₂)_nX(CH₂)_m-, X being CH₂, O, or NH; n, m is an integer from 1 to 6;

P is hydrogen, an alkyl, substituted alkyl, benzyl, trialkylsilyl, or substituted benzyl, the substituted group being a phenyl, naphenyl, halo, nitro, hydroxy;

R⁴ is an alkyl, substituted alkyl, benzyl, trialkylsilyl, or substituted benzyl, the substituted group being a phenyl, naphenyl, halo, nitro, hydroxy, C₁~C₃ hydroxyalkyl, C₁~C₄ alkyl, C₁~C₃ alkoxy or CN;

the electron-withdrawing group is a halogen, NO₂, CF₃, CH₃SO₂, CH₃CH₂SO₂, PhCH₂OCO, or AcO;

the electron-donating group is an alkoxy, OH, Me₂NCH₂CH₂O, Et₂NCH₂CH₂O, NH₂, or C₁~C₄ alkyl.

Claim 6 (Currently amended): The process of claim 1, wherein R¹ and R² is a C₁~C₂₀ alkyl, C₁~C₂₀ substituted alkyl, trialkylsilyl, benzyl, or substituted benzyl, the substituted group being a phenyl, naphenyl, halo, nitro, hydroxy, C₁~C₃ hydroxy alkyl, C₁~C₂₀ alkyl, or C₁~C₃ alkoxy, or R¹, R² being -(CH₂)_nX(CH₂)_m-, X being CH₂, O, or NH;

n, m is an integer from 1 to 6;

R³ is a C₁~C₂₀ alkyl, C₁~C₂₀ alkyl substituted with an alkoxy or silyoxy, carboxylic group, C₁~C₂₀ carbalkoxy group, hydroxyl methyl, C₃~C₂₀ cycloalkyl, aryl, or CH₂OR⁴, R⁴ being a C₁~C₂₀ alkyl, C₁~C₂₀ substituted alkyl, benzyl, or substituted

benzyl, the substituted group being a phenyl, naphenyl, halo, nitro, hydroxy, C₁~C₃ hydroxyalkyl, C₁~C₄ alkyl, C₁~C₃ alkoxy, or CN;

Z is H, F, Cl, Br, I, CH₃SO₂, OH, PhCH₂O, AcO, MeO, EtO, Me₂NCH₂CH₂O, Et₂NCH₂CH₂O, PhCH₂OCO, *t*-Bu, *i*-Pr, NH₂, or NO₂;

P is hydrogen, a C₁~C₂₀ alkyl, C₁~C₂₀ substituted alkyl, benzyl, trialkylsilyl or substituted benzyl, the substituted group being a phenyl, naphenyl, halo, nitro, hydroxy, C₁~C₃ hydroxyalkyl, C₁~C₄ alkyl, C₁~C₃ alkoxy, or CN;

Y is H, F, Cl, Br, I, CH₃SO₂, OH, PhCH₂O, AcO, MeO, EtO, Me₂NCH₂CH₂O, Et₂NCH₂CH₂O, PhCH₂OCO, *t*-Bu, *i*-Pr, NH₂, or NO₂;

Rf is a C₁~C₂₀ fluoro-containing alkyl;

R is a trialkylsilyl, C₁~C₂₀ alkyl, C₃~C₂₀ cycloalkyl, or aryl group.

Claim 7 (Previously presented): The process of claim 1, wherein R¹ and R² is a C₁~C₄ alkyl, tri-phenylmethyl, *t*-butyldimethylsilyl, benzyl unsubstituted or substituted with C₁~C₄ alkyl, *para*-methoxy benzyl, *para*-nitrobenzyl, *para*-chlorobenzyl, 2, 4-dichlorobenzyl, or 2, 4-dimethoxybenzyl, or R¹, R² being - (CH₂)₂O(CH₂)₂- , -(CH₂)₂N(CH₂)₂- , -(CH₂)₅- , or -(CH₂)₆-;

R³ is a C₁~C₄ alkyl, C₁~C₄ alkyl substituted with alkyloxy or silyoxy, carboxylic group, C₁~C₄ carbalkoxy group, hydroxyl methyl, C₃~C₆ cycloalkyl, aryl or CH₂OR⁴, R⁴ being a C₁~C₄ alkyl, tri-phenyl methyl, *t*-butyl- dimethylsilyl, benzyl unsubstituted or substituted with C₁~C₄ alkyl, *para*-methoxy benzyl, *para*-nitrobenzyl, *para*-chlorobenzyl, 2, 4-dichlorobenzyl, 2, 4- dimethoxybenzyl, or trialkylsilyl groups;

Z is H, F, Cl, Br, I, CH_3SO_2 , OH, PhCH_2O , AcO, MeO, EtO, $\text{Me}_2\text{NCH}_2\text{CH}_2\text{O}$, $\text{Et}_2\text{NCH}_2\text{CH}_2\text{O}$, PhCH_2OCO , *t*-Bu, *i*-Pr, NH₂, or NO₂;

P is hydrogen, a C₁~C₄ alkyl, tri-phenylmethyl, *t*-butyldi- methylsilyl, benzyl unsubstituted or substituted with C₁~C₄ alkyl; *para*-methoxy benzyl, *para*-nitrobenzyl, *para*-chlorobenzyl, 2,4-dichlorobenzyl, or 2, 4-dimethoxy- benzyl;

Y is H, Cl, Br, CH_3SO_2 , $\text{CH}_3\text{CH}_2\text{SO}_2$, NO₂, or F;

Rf is a C₁~C₄ fluoro-containing alkyl;

R is a C₁~C₄ alkyl, C₃~C₆ cycloalkyl, or aryl group, aryl being a phenyl, naphenyl, furan, thiophene, or pyrrole;

halogen or halo is a fluoro, chloro, bromo, or iodo.

Claim 8 (Previously presented): The process of claim 1, wherein stoichiometric ratios are about 0.1- 3 : 0.1-3 : 1-4 :1 of ligand : Zinc salt: the organic base : substrate ketone or ketimine.

Claim 9 (Previously presented): The process of claim 1, wherein the salt is ZnCl₂, ZnBr₂, ZnF₂, ZnI₂, Zn(OTf)₂, CuCl₂, CuBr₂, Cu(OTf)₂, CuCl, CuBr, or Cu(OTf).

Claim 10 (Previously presented): The process of claim 1, wherein the organic base is MeN(*i*Pr)₂, HNEt₂, N(*i*Pr)₃, pyridine, NEt₃, piperidine, EtN(*i*Pr)₂, or Bu₃N.

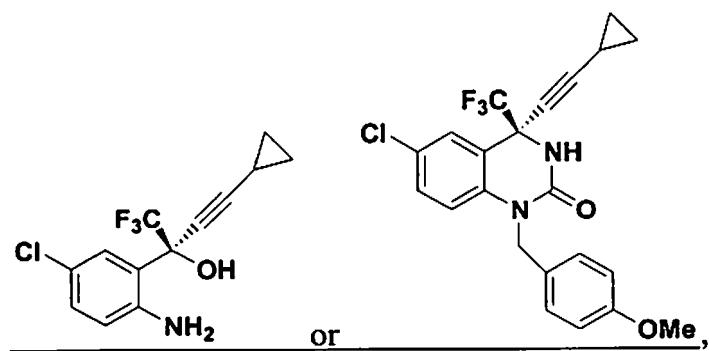
Claim 11 (Previously presented): The process of claim 1, wherein reaction temperature is 0-100°C.

Claim 12 (Previously presented): The process of claim 11, wherein the reaction temperature is 0-50°C.

Claim 13 (Previously presented): The process of claim 1, wherein the aprotic solvent is THF, dioxane, Et₂O, benzene, a mono or multi-alkyl substituted-benzene, DME, toluene, n-hexane, CH₂Cl₂, cyclohexane, or a mixture thereof.

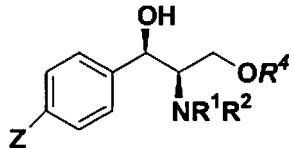
Claim 14 (Previously presented): The process of claim 1, further comprising the step of quenching the mixture by adding a proton source to give the chiral compound.

Claim 15 (Currently amended): The process of claim 1 for asymmetric synthesis of chiral compound of



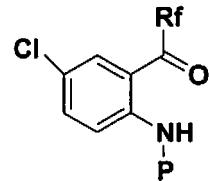
comprising the steps of

(a) mixing 0.1~3 molar equivalent of (1R,2R)-2-N,N-substitutedamino-1-(4-Z-substituted- phenyl)-3-O-R⁴-substituted propane-1-ol having a formula of

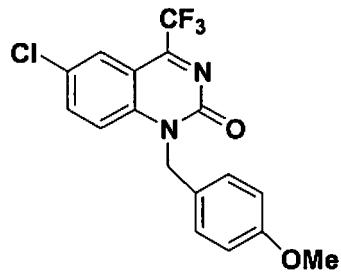


with 0.1~3 molar equivalent of cyclopropylacetylene, 0.1~3 molar equivalent of Zn(II), Cu(I)or Cu(II) salts, and 1~4 molar equivalent of an organic base in organic solvent to form a mixture;

(b) mixing with the mixture of step (a) with 1.0 molar equivalent of a reactant having a formula of



or

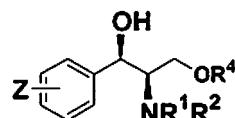


and maintaining resulting reaction mixture at a temperature of between about 0-50°C for 1-20 hrs;

(c) quenching by adding a proton source;

(d) obtaining the chiral compound.

Claim 16 (Currently amended): A compound or its enantiomer having a formula of



wherein R¹, R² is an amino protecting group;

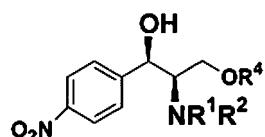
R⁴ is an oxygen protecting group;

Z is NO₂, CH₃SO₂, or CH₃CH₂SO₂ CH₃CH₂SO₃[;], and

when Z is NO₂ at 4-position of the phenyl, R¹ is =o, R² is COCH₃, R⁴ is an alkyl, substituted alkyl, benzyl, substituted benzyl, or trialkylsilyl[;], or

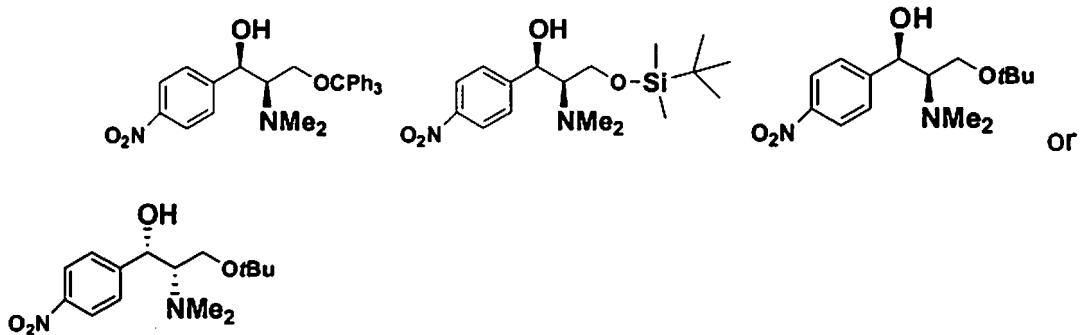
when Z is NO₂ at 4-position of the phenyl, R¹, R² is CH₃, the ligand is (1R, 2R)-2-N,N-dimethylamino-1-(4- nitrophenyl)-3-O-R⁴-1-propanol.

Claim 17 (Currently amended): The compound of claim 16 having a formula of or its enantiomer



wherein Z is NO₂ at 4 position of the phenyl.

Claim 18 (Previously presented): The compound of claim 16, having a formula of or its enantiomer



Claim 19 (Currently amended): The compound of claim 16, wherein R¹ and R² is an alkyl, substituted alkyl, benzyl, trialkylsilyl, or substituted benzyl, the substituted group being a phenyl, naphenyl, halo, nitro, hydroxy, C₁~C₃ hydroxyalkyl, C₁~C₄ alkyl, or C₁~C₃ alkoxy, or R¹, R² being -(CH₂)_nX(CH₂)_m-, X being a CH₂, O, or NH;

n, m is an integer from 1 to 6;

R⁴ is an alkyl, substituted alkyl, benzyl, or substituted benzyl, the substituted group being a phenyl, naphenyl, halo, nitro, hydroxy, C₁~C₃ hydroxy alkyl, alkyl, C₁~C₃ alkoxy, or CN;

Z is NO₂, CH₃SO₂, or CH₃CH₂SO₂ [;], and

when Z is NO₂ at 4-postion of the phenyl, R¹ is N=O, R² is COCH₃, R⁴ is only alkyl, substituted alkyl, benzyl, substituted benzyl, or trialkylsilyl[;], or

when Z is NO₂ at 4-postion of the phenyl, R¹, R² is CH₃, the ligand is (1*R*, 2*R*)-2-*N,N*-dimethyl-1-(4- nitrophenyl)-3-O-*R*⁴-1-propanol.

Claim 20 (Currently amended): The compound of claim 16, wherein R¹ and

R^2 is a $C_1\sim C_{20}$ alkyl, $C_1\sim C_{20}$ substituted alkyl, trialkylsilyl, benzyl, or substituted benzyl, the substituted group of alkyl or benzyl being a phenyl, naphenyl, halo, nitro, hydroxy, $C_1\sim C_3$ hydroxyalkyl, $C_1\sim C_4$ alkyl, $C_1\sim C_3$ alkoxy, or CN, or R^1, R^2 being -
(CH_2) $_n$ X(CH_2) $_m$, X being CH₂, O or NH;

n, m is an integer from 1 to 6;

R^4 is a $C_1\sim C_{20}$ alkyl, $C_1\sim C_{20}$ substituted alkyl, benzyl, trialkylsilyl, or substituted benzyl, the substituted group being a phenyl, naphenyl, halo, nitro, hydroxy, $C_1\sim C_3$ hydroxyalkyl, $C_1\sim C_4$ alkyl, $C_1\sim C_3$ alkoxy, or CN;

Z is CH₃SO₂ or NO₂[;], and

when Z is NO₂ at 4-position of the phenyl, R^1 is $\text{N}=\text{O}$, R^2 is COCH₃, R^4 is an alkyl, substituted alkyl, benzyl, substituted benzyl, or trialkylsilyloxy[;], or when Z is NO₂ at 4-position of the phenyl, R^1 , R^2 is CH₃, the ligand is (1R, 2R)-2-N,N-dimethyl- amino-1-(4- nitrophenyl)-3-O- R^4 -propane-1-ol.

Claim 21 (Currently amended): The compound of claim 16, wherein R^1 and R^2 is a $C_1\sim C_4$ alkyl, tri-phenyl methyl, *t*-butyldimethylsilyl, benzyl unsubstituted or substituted with $C_1\sim C_4$ alkyl, *para*-methoxy benzyl, *para*-nitrobenzyl, *para*-chlorobenzyl, 2, 4-dichlorobenzyl, 2, 4-dimethoxybenzyl;

R^4 is a $C_1\sim C_4$ alkyl, tri-phenyl methyl, *t*-butyldimethylsilyl, benzyl unsubstituted or substituted with $C_1\sim C_4$ alkyl, *para*-methoxy benzyl, *para*-nitrobenzyl, *para*-chlorobenzyl, 2, 4-dichlorobenzyl, or 2, 4-dimethoxybenzyl;

Z is CH₃SO₂ or NO₂[;], and

when Z is NO₂ at 4-position of the phenyl, R¹ is N=O, R² is COCH₃, R⁴ is an alkyl, substituted alkyl, benzyl, substituted benzyl, or trialkylsilyl[,], or

when Z is NO₂ at 4-position of the phenyl, R¹, R² is CH₃, the ligand is (1R, 2R)-2-N,N-dimethyl-amino-1-(4-nitrophenyl)-3-O-R⁴-propane-1-ol.